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Data Network Design

- Packet Switching
- Frame Relay
- 802.6/DQDB (SMDS)
- ATM (B-ISDN)
- SONET

Darren L. Spohn

Jay Ranade,
Series Advisor

McGraw-Hill Series on Computer Communications

Data Network Design

Darren L. Spohn

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2.1.2 Network Perception

One important factor to address when performing the business case is the executive perception of the network need. Not only must company executives understand what the data engineers and managers are trying to accomplish, but they must also understand the basic technology at hand. This begs the question — "How familiar are executives with the technology being used?" Familiarity begins with the executive using a PC in his or her daily tasks, assuming that the executive does not just use his or her PC for electronic mail and word processing. This could take the form of a desktop, laptop, or even a terminal using an multimedia applications. If these fundamentals are not used by the executive making the decisions for data communications systems, it will be difficult for the executive to relate to more broad-based computer communications decisions. In some cases, one must use highly developed consultative skills to cost justify network expansion via efficiency studies. Corporate executives handle decisions at a strategic level. Engineering management handles decisions on an operational or tactical level. Executives can best relate to the strategic importance of a communications network if they understand the underlying computer technology. They must understand how the technological decisions will affect their organization's strategic mission.

The technical aspect of the business case is just as important as the financial aspects. What may look good in numbers may position the company for technical disaster or obsolescence. One will also find trade-offs in the initial design, either integrating the most critical applications or lowest-priority applications. Make sure that both the technology and the financial, as well as the strategic and operational, perspectives are studied before a business decision is made.

2.1.3 From Centralized to Distributed Networks

Computer communications networks have quickly evolved from centralized power computing using mainframes, through the minicomputer era and now into the personal microcomputer and distributed processing era. The first data computer communications networks resembled a hierarchical star topology. All access from remote sites was homed back to a central location where the mainframe computer resided (usually an IBM host or DEC VAX). Figure 2.1 shows this centralized, hierarchical computer concept.

Today, more and more computing is accomplished through distributed processing. Most sites have the intelligence and capability to communicate with many other sites directly on a peer level, rather than through a centralized computer, although the host can be appraised of what took place and can maintain the database from which management reports can be generated and operations and maintenance issues addressed, such as IBM's NetView. Also, the actual processing of information is distributed among many of the user sites, rather than done solely at a centralized location.

Figure 2.2 shows a computer communications network with distributed processing. Many local, metropolitan, and wide area networks are built with the concept of distributed processing in mind.

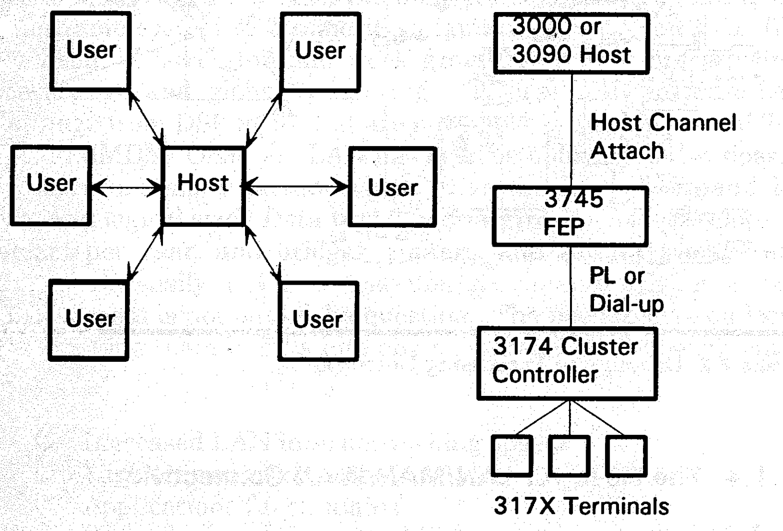
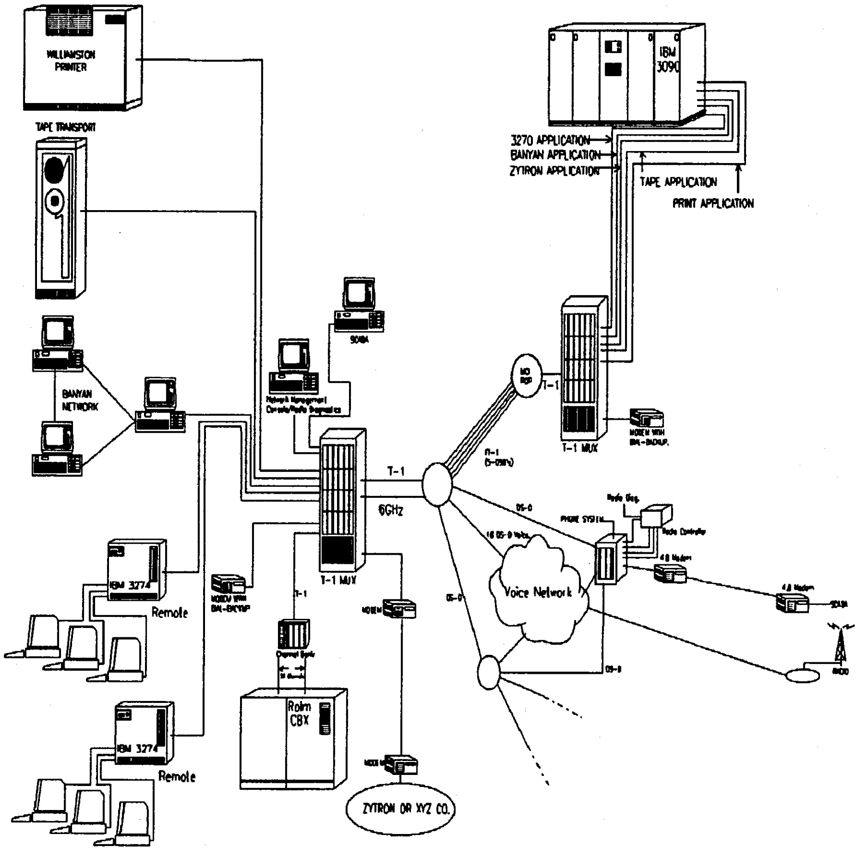

User
User
User
Host
User
User
User
3000 or
3090 Host
Host Channel
Attach
3745
FEP
PL or
Dial-up
3174 Cluster
Controller
317X Terminals

Figure 2.1 Centralized Hierarchical Topology


WILLIAMSTON PRINTER
TAPE TRANSPORT
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3270 APPLICATION
BANYAN APPLICATION
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PRINT APPLICATION
BANYAN NETWORK
T-1
T-1 MUX
6GHz
IBM 3274
Remote
IBM 3274
Remote
Rolm CBX
Voice Network
ZYTRON OR XYZ CO.

Figure 2.2 Distributed Processing Network

2.1.4 The Need for LAN/MAN/WAN Connectivity

Previously, two scenarios were outlined: the corporation now needs a LAN to allow internetworking between distributed computing devices; and the corporation's LANs have exceeded the bounds of their local existence and now need connectivity across a larger geographic area. The geographically dispersed LANs now have a choice of connectivity ranging from dedicated circuits to transport via a switched wide area or metropolitan area network. The decision of technology and services is based upon many factors other than cost.

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